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The Specification of Property Rights and Compensation Payments for Conservation: an Application of Bromley's Model of Property Rights

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Bromley developed a model of property rights which used agricultural land to illustrate how those with existing property rights had the advantage over those with emerging and competing demands, Bromley (1991) and Bromley and Hodge (1990). This is in contrast to the Coase model where there is no difference in outcome whoever held the initial property right, Coarse (1960). This paper, using property rights relating to agricultural land use as an example, reviews the Bromley model of property rights and shows how this helps to explain some of the differences in compensation paid for environmental enhancement under two schemes with differing specifications of property rights.

1. Property Rights and Agricultural Land Use

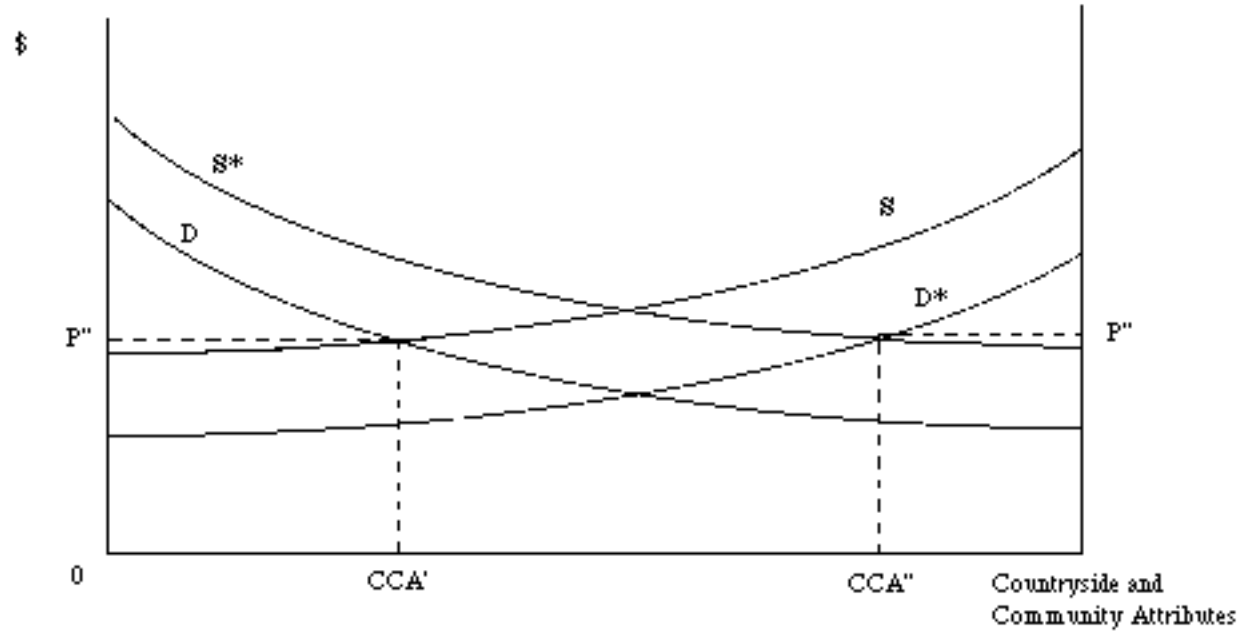
Agricultural land use generally has well developed rights of ownership protecting the right to produce food. These rights have often been developed over long periods, for example, the enclosures, and long-term tenancy laws. However, over the last few decades different pressures on land use have emerged. These reflect the growing wealth of the urban population, which has had two effects. First, low or negative income elasticities for farm gate produce have reduced incomes to farmers, encouraged the reduction in agricultural employment and rural communities, and increased pressure for agricultural support. This support has generally been output linked which, coupled with government aided research and development, has caused rapid technological change in food production. As a consequence a number of negative externalities have occurred, such as chemical residues; loss of landscape features; soil erosion; and water pollution. Secondly, rising incomes in the non-agricultural sector, coupled with rising mobility, have increased the demand for environmental goods, such as access to countryside; diverse wildlife; and landscape diversity and features. Many of these new demands on the countryside are public good in nature and therefore it is not so much an individual who has the incentive or ability to compensate for their provision, as society. Thus the changes in demands from land use have led to government intervention to modify land use using a variety of policies.

Policy mechanisms providing conservation range from regulation and planning control, to subsidies for rural/agricultural employment, taxes on chemicals and intensive enterprises, capital tax restructuring and incentives to maintain conservation features. It is the latter which is of interest here to illustrate the effect of different specifications of property rights on compensation paid using the framework of Bromleyís model.

2. Bromley's Model of Property Rights

Bromley defines the non food goods provided by agriculture as Countryside or Community Attributes (CCAs), Bromley (1991). (Other labels have also been attached to the these such as CARE goods, that is Countryside Amenity and Rural Environmental goods, McInerney 1986)). In examining the structure of property rights Bromley examines CCAs and assumes they are inversely related to food production whilst recognising that up to a certain point they well might be complementary.

Bromley then goes on to compare two alternative specification of property rights, firstly where the farmer has an a priori right to produce food and secondly where society (or the individual) has an a priori right to the current (or ideal) level of CCAs [1] as illustrated in Figure 1.



Source : Bromley (1991)

Figure 1
Bromley's Alternative Model of Property Rights

If we initially assume that farmers have the right to produce food and fibre then to induce them to reduce production and provide more CCAs some form of compensation needs to be offered. This compensation is presumably related to the profits forgone and is illustrated by the upward sloping function S in Figure 1 which shows that as more CCAs are required the compensation payments have to be raised. The rest of society have a demand for CCAs as

[1] In representing the right hand side of his model it is not clear whether the environmental state being referred to is the status quo or some ideal. Here the current level of CCA's is used.

shown by the downward sloping function D, illustrating their willingness to pay declining as CCAs increase. In equilibrium we have optimum provision of CCAs at CCA' and level of payment offered P', given that initial specification of property rights.

If, however, society has the a priori right to CCAs then farmers would be willing to purchase some of these rights to CCAs off society for the right to increase production. This is likely to be closely related to the profits from increase in production and is illustrated by D*. Society is willing to accept compensation for the reduction in CCAs at an increasing rate as illustrated by S*. Thus a different equilibrium would be reached with area protected being CCA" for average hectarage payment of P". This shows that when property rights for CCAs are with society a greater amount will be provided for a lower cost than when farmers have the a priori right to produce. This is in contrast to the Coase theorem where the outcome does not depend upon the original specification of property rights (Coase 1960).

This difference between the levels of compensation depending upon the initial specification of property rights is parallel to the difference between compensating and equivalent variation in Hicksian demand theory. Bromley's model assumes that there is a difference between society's willingness to pay (WTP) for CCAs, when farmers have the right to produce, and society's willingness to accept (WTA) compensation for the reduction in CCAs if society has an a priori right to CCAs, (or alternatively farmers WTA compensation for reduction in output and WTP compensation to increase output). Only if there is no income effect or transaction costs is this difference assumed to be zero.

There have been a number of studies which estimate the difference between willingness to pay compensation (WTP) and the willingness to accept compensation (WTA), as reviewed in Carson et al, (1996). Most of these studies have been in relation to the measurement of non-market goods, using Contingent Valuation, and relate to a hypothetical market. These studies have in general found that WTP is smaller than WTA. Generally this difference has been assigned to the income effect as income constrains the former but not the latter, as well as the risk adverse nature of individuals. The impact of transactions costs on this has been less well documented. Transaction costs are unlikely to be equal given that it is the party without the initial property right that has to initiate negotiations. These initiation costs include the costs of providing information; finding proof; as well as the actual costs of approaching and starting negotiations. To assess the impact of these transaction costs an example of two policies with different specifications of property rights are examined below.

3. Two Policies Providing Environmental Goods with Different Structures of Property Rights

An example of actual compensation under different property right structures is the payment to farmers for provisions of conservation goods under two schemes in the UK. These two schemes, ESA and SSSI are designated areas of high environmental quality that are under threat. Both schemes offer compensation payments for compliance with management agreements. The schemes differ in that SSSI involves a change in property rights when designated by the conservation agency, whereas participation in ESA is entirely voluntary and therefore there is no change in property rights. The provision of conservation goods under these schemes could be assumed to approximate CCAs.

3.1 Development of Sites of Special Scientific Interest (SSSI)

Sites of Special Scientific Interest (SSSI) are as their name suggests areas of special scientific interest designated due to their flora, fauna, geology or physiology. Whilst they have been in existence since 1949 they were redesignated under the 1981 Wildlife and Countryside Act with grater scope for compensation. Under the current system owners/occupiers have to notify the conservation agency of any potentially damaging operation (PDO). If the conservation agency does not approve of this PDO then they have to enter into negotiation with the owner/occupier and draw up a management agreement. Compensation is then paid to the owner/occupier based upon profits forgone, that is the difference in profitability between current and proposed land uses. All management agreements are individually negotiated and owners/occupiers are reimbursed for professional negotiation fees[2].

3.2 Development of Environmentally Sensitive Areas (ESA)

ESA were designated in 1987 and are areas of national environmental significance where its conservation depends upon particular farming practices which are under threat. They are typically much larger areas than SSSI. In England ten areas were initially designated and by 1992 the area designated had risen to 0.8 million hectares with 6000 farms under agreement covering 285,000 hectares. From 1993 a further six areas were designated and under current agri-environment proposals another six are proposed.

Participation is voluntary and farmers in ESAs are offered a five year agreement which awards them an annual payment in return for following a prescribed set of farming practices. Both the practices and the rates of payment are standard within areas, but differ between

[2]There are limitations in this system of protection. It is more effective when there is a proposed change in the farming system but is less effective when a more subtle change, such as increases in the stocking rate, occurs.

ESA. The rates of payment take account of profit forgone by following the prescribed management practices.

4. Comparison of the SSSI and ESA

A number of studies have examined the operation of SSSI and ESA. These include estimates of the public exchequer and social cost of compensation under management agreements Black and Bowers (1984), Saunders et al. (1987) and Saunders (1996b). Other studies have compared the current system of management agreements based on opportunities forgone with other methods of compensating farmers; Colman et al. (1992), Whitby et al. (1990). Also the two mechanisms have been compared in Brotherton (1991) and Hodge et al. (1992) which discussed the differences between the protected status. The cost of protecting designated areas was covered in Whitby and Saunders (1994).

Whitby and Saunders (1994) found that the financial costs of SSSI agreements, including compensation, negotiating and monitoring, were £8 per hectare of SSSI land and £95.7 per hectare for the area under agreement. This includes not only compensation cost which accounts for 76 per cent of the total but the direct financial costs of negotiation by the agency and the owner/occupier. In case of ESA the average cost per hectare of agreement was calculated to be £90 per hectare for the period 1988 through to 1991. Therefore the cost of protecting the area is lower under SSSI than under ESA although the cost of management agreement is similar due to the different specification of property rights.

The Bromley model is used in Figure 2 to highlight certain features of these two schemes[3] and their cost effectiveness, assuming that land in ESA or SSSI provides similar CCAs[4]. - Given that the ESA scheme is voluntary it is an example of a policy where farmers still have the right to produce (and therefore reduce CCAs) and society has to buy back that right from owners/occupiers. Thus equilibrium is reached where the WTP for increase in land under ESA (D) equals farmers WTA compensation for the loss in rights (S), as illustrated in Figure 2 starting from the left hand side. In this case we have an equilibrium average compensation payment of P' and uptake of Q'. Given data availability it is not possible to estimate the slope of the functions D and S, however the equilibrium is known and calculated as a price of £90 and quantity of 285,000 hectares, Whitby and Saunders (1994). Some studies have attempted to measure the social benefits of ESA and other schemes, Willis et al. (1995) but this only measured the overall benefit. The benefit per hectare is yet to be estimated and therefore it is not feasible to estimate D. Likewise individual studies of

[3]The analysis differs from an earlier application of the model to SSSI by Hodge and Bromley which assumed that in the case of SSSI the initial property rights still remained with the landowner/manager, Bromley and Hodge (1990).

[4]The prescriptions for SSSI and ESA land do differ with the former generally being more restrictive and therefore providing greater levels of CCAs than the latter, however here they are assumed to be the same.

ESA have obtained some data on the shape of the WTA compensation by area, Saunders (1994a). This, whilst indicating an upward sloping function, is not sufficient to derive an aggregate function for S over the whole ESA area.

SSSI provide an example where farmers do not have the right to alter the level of production and reduce CCAs thus start at the right hand side of the Figure 2. However, farmers are not able to buy back the right to change production on SSSI. In fact society actually pays them compensation if they state their intention to change land use, thus removing the income effect.

The farmers WTP for the right to increase production, and thus reduce the CCAs, and damage the SSSI, will presumably be the profits from the increased production. As the compensation paid to farmers by society is based upon their profits forgone for not increasing production (individually negotiated), it is assumed that they are equivalent and so we can derive D*. As no mechanism exists for society to allow farmers to degrade SSSI this implies that the demand curve for protection to SSSI is at, or close to, the maximum area of SSSI (S*) (the left axis on the diagram). So it is not possible to derive S*, the WTA compensation by society for farmers to degrade land. This implies that the whole of the SSSI will be under agreement and as agreements are individually negotiated the cost is the area under D*. However, in reality only a small proportion of agricultural SSSI is under agreement; that is, 8 per cent or 77 thousand hectares out of 915 thousand hectares, Whitby et al. (1990)[5]. So the actual WTP for the right to produce is better represented by D*'. The main difference between D* and D*' is the non-financial costs of negotiation. That is the cost to the farmer of initiating the negotiation as well as the length of negotiation, (presuming that the longer a farmer is willing to negotiate the higher the level of compensation). This is enough of a disincentive for producers not to propose land use change, or when they do to accept low levels of compensation.

In theory we should be able to compare the curves S (WTA compensation of loss in production rights under the ESA) and D*' (WTP to increase production) to show the difference between equivalent and compensating variation. Comparison is also made difficult in practice due to the mechanism by which compensation for ESA and SSSI are determined namely the former is an average price for all agreements and the other are individually negotiated. So whilst we can derive D*', and determine equilibrium of D and S, it is not possible to derive S*.

Theoretically the main differences between the two methods of compensation is the income effect, but this has limited relevance here, as farmers are compensated in both cases. So any

[5] Not all the SSSI agricultural area may be under threat of a change in land use given ownership by public or conservation bodies and unsuitability for improvement. Nevertheless the fact still remains that only a small proportion of SSSI land is covered by compensation payments.

difference between the two is due to other factors, in particular transaction costs such as the initiation costs highlighted by Bromley (those who do not have initial property right bear the costs of initiating the negotiation procedure). This does indicate the size of those costs which are considerable.

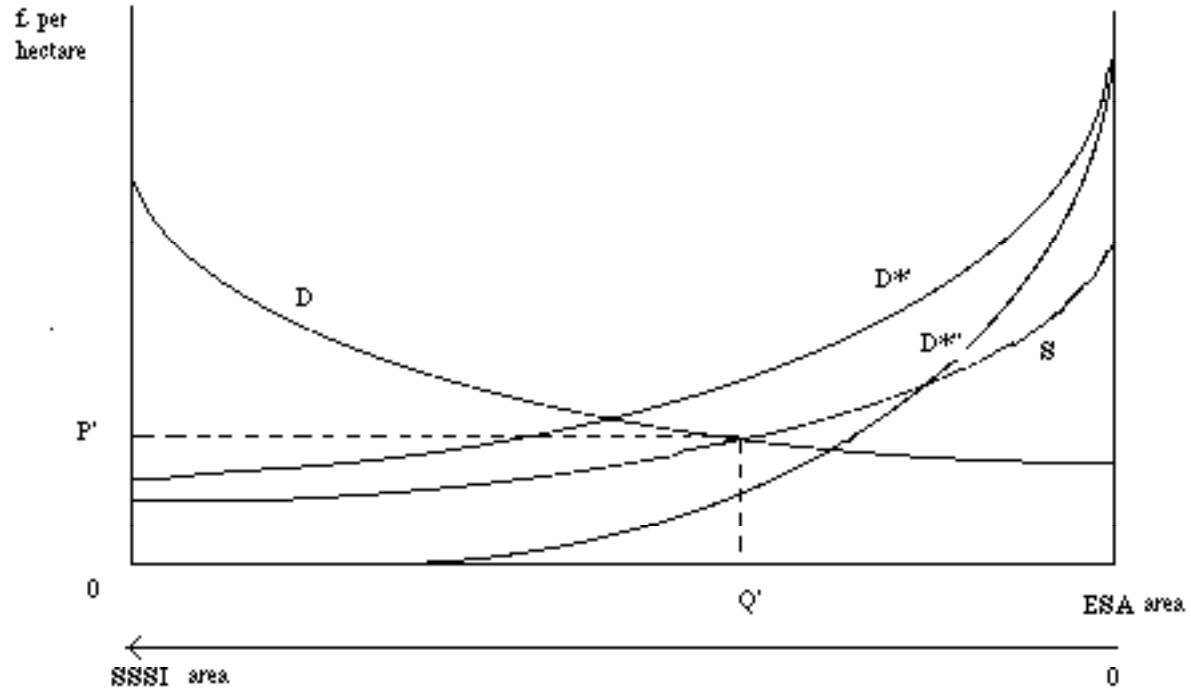


Figure 2

Bromley Model of Alternative Property Rights and Compensation in ESA and SSSI

The amount of land providing CCAs under the ESA scheme is OQ' at average price P', therefore the total cost is Q' multiplied by P'. In the case of SSSI all the area is protected and provides CCAs at a cost of the area under D*'. As stressed in Whitby and Saunders (1994) this has meant the cost of protecting SSSI land, where property rights have been removed from the farmer, to be less than for ESA land despite the former allowing more scope for negotiating higher payments. The difference between D*' and S, (the willingness to pay for the right to improve SSSI and the willingness to accept compensation for not improving ESA) shows this and the impact of transaction costs.

5. Conclusion

Bromley's alternative model of property rights illustrates the importance of property rights on the provision of CCAs. As the model predicts the initial specification of property rights this has important implications for the CCAs provided as well as for the cost of this proviso. Under the ESA policy where producers maintain the initial rights to produce and therefore reduce CCAs the area protected is less and the cost of protection higher than SSSI, where the opposite is the case.

However the difference in cost between ESA and SSSI is less to do with the well documented income effect or even the financial cost of negotiation (as farmers are compensated under both policies) but in the initiation cost of negotiation. This perhaps reflects the supposed reluctance of farmers to enter into bureaucratic procedures. Also the fact that the land has conservation interest implies it has been managed in a low intensive way and whilst to an economist this has an alternative use to the existing farmer his objective may not be so much maximum profit but profit maintenance making development of marginal farm land not as important. However this is not to say that with a change in ownership or market conditions, this would not be under threat and the CCAs reduced.

Why the cost of SSSI is less than would be predicted and initiation costs a barrier to negotiation is not totally clear. Informal discussions with land agents for the conservation agencies and landowners do indicate that farmers are willing to provide CCAs at a low cost given good relations and consultation between the conservation agency and the landowner. This is also borne out by schemes which rely on the voluntary principle without compensation such as covenants, Saunders (1996a).

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